APPENDIX A

Some short exercises with each type of formula previously discussed illustrates their use and use of interest tables. Assume a discount rate of 7% for each example. Any slight difference is due to rounding.

Example 1

Given that a $40,000 pile jacketing will be required on a bridge in year 20 of its 50 year life, find the Present Worth of that expenditure.

Solution: Find P given F.

$P = 40{,}000[1/(1.07)^{20}] = \underline{\$10{,}337}$

or

P = 40,000 x (P/F, 7%, 20 yrs) = 40,000 x (0.2584) = $\underline{\$10{,}336}$.

Example 2

As a check on Example 1, fine the Future Worth in year 20 of an initial outlay of $10,337.

Solution: Find F given P.

$F = 10{,}337 \times (1 + 0.07)^{20} = \underline{\$40{,}001}$

or

F = 10,337 x (F/P, 7%, 20) = 10,337 x (3.8697) = $\underline{\$40{,}001}$

Example 3

A new roadway project costs $2,100,000. What is the Annual Worth of this initial cost? Assume a 40 year life.

Solution: Find A given P:

$A = 2{,}100{,}000\{[0.07(1.07)^{40}]/[1.07^{40} - 1]\} = \underline{\$157{,}519}$

or

A = 2,100,000 x (A/P, 7%, 40) = 2,100,000 x (0.0750) = $\underline{\$157{,}500}$

Example 4

As a check of Example 3, find the Present Worth of an annual outlay of $157,519.

Solution: Find P given A.

$P = 157{,}519\{[(1.07)^{40} - 1]/[0.07(1.07)^{40}]\} = \underline{\$2{,}099{,}997}$

or

P = 157,519 x (P/A, 7%, 40) = 157,519 x (13.3317) = $2,099,997

Example 5

Find the Annual Worth of a $750,000 bridge widening project in year 50 of a bridge's life.

Solution: Find A given F.

$A = 750{,}000\{(0.07)/[(1.07)^{50} - 1]\} = \underline{\$1{,}845}$

or

A = 750,000 x (A/F, 7%, 50) = 750,000 x (0.0025) = $1,875

Example 6

As a check on Example 5, find the Future Worth of an annual outlay of $1,845.

Solution: Find F given A.

$F = 1{,}845[(1.07^{50} - 1)/(0.07)]$

or

F = 1,845 x (F/A, 7%, 50 = 1,845 x (406.5289) = $750,046

These examples illustrate the use of the formulas defined previously. As shown, the use of interest tables simplifies the problem solving significantly. The tables cannot, however, be used if a discount rate or analysis period is not included in the tables. In this case use the formulas.